

REMARKS

In accordance with the foregoing, claims 1, 17, 18, 20, 22, and 25 are amended. No new matter is added. Claims 1, 3-18, 20, 22, and 25 are pending and under consideration.

INTERVIEW WITH THE EXAMINER

Applicants acknowledge with appreciation the courtesy of granting an interview to the Applicants' representative on November 9, 2007 at which time the outstanding issues in this case were discussed. Arguments similar to the ones developed hereinafter were presented and the Examiner indicated that in light of the arguments and the amended claims, he would reconsider the outstanding grounds for rejection upon formal submission of a response.

CLAIM REJECTIONS UNDER 35 U.S.C. §112

In the outstanding Office Action, claims 18, 20 and 22 are rejected under 35 U.S.C. §112, first paragraph, relative to the recitation a "spectrum width obtained based on a bit rate and a type of coding of each of said optical signals" (clarifications relative to the scope of the rejection became clearer during the interview of November 9, 2007). Since this recitation constitutes a term of comparison rather than a characteristic of the claimed inventions, Applicants amend the claims herewith to remove this recitation and direct the comparison to an initial spectrum width, that is, the spectrum width without applying the invention. In view of the claim amendments, Applicants respectfully request the rejection to be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1 and 17 are rejected as allegedly being unpatentable over S. Bigo et al., "Improving Spectral Efficiency by Ultra-Narrow Optical Filtering to Achieve Multi-Terabit/s Capacities", OFC 2002, 17-22 March 2002 (hereinafter Bigo) in view of U.S. Patent No 6,865,348 by Miyamoto et al. ("Miyamoto"). Claims 3-12 are rejected as allegedly being unpatentable over Bigo, Miyamoto and further in view of U.S. Patent No. 6,496,297 B1 to Frankel et al. ("Frankel"). Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto in further view of "Optical Networks", second Edition by Ramaswami et al., Academic Press, 2002, Published 12 October 2001, pp. 139-143 ("Ramaswami"). Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo, Miyamoto and Frankel in further view of Ramaswami. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo, Miyamoto and Frankel in further view of U.S. Patent Application Publication No.

2002/0025111 to Koshi ("Koshi"). Claims 16 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto in further view of U.S. Patent No. 6,690,886 B1 to Guy ("Guy").

Claim 1 patentably distinguishes over the cited prior art at least because:

- A. Bigo is not an enabling reference teaching away from the claimed features;
- B. the prior art references do not teach or suggest at least "a plurality of optical senders outputting signal lights with different wavelengths and filtered by a plurality of respective filters to yield filtered signal lights having respective bit rates and frequency spacing to approach a spectrum efficiency maximizing a product of a transmission distance and a transmission capacity of the system."

A. In the amendment filed on June 4, 2007, Applicants argued that Bigo is not an enabling reference, because it does not disclose a system as recited in claim 1, but merely speculates based on simulations that using "ultra-narrow optical filters" increases the spectral efficiency with respect to that of the state of the art equipment (See Bigo, Introduction section).

In the "Response to Arguments" section of the outstanding Office Action, the Examiner states that it is unclear why Applicants asserted that Bigo is not an enabling reference. A reference is not enabling if it merely discloses a simulation and not a practical implementation. The technical problems and consequences of actually implementing an idea are not foreseeable merely by simulating a desirable positive impact. In lines 12-16 in the Introduction, Bigo states "we show **numerically** that narrow, centered optical filters **may** significantly reduce the amount of cross-talk of **RZ** data when inserted before wavelength multiplexing" (emphasis ours). The question is not whether Bigo is prior art due to its date, but whether what Bigo discloses is a valid technical precedent which, for example, would constitute a basis for a patent application that would be declared senior to the current patent application in an interference proceeding. In such a proceeding, the first question is whether the allegedly senior application is enabling and Applicants submit that Bigo is NOT enabling.

Bigo suggests "To reach higher spectral efficiencies, isolating one of the two redundant side-bands of each channel via off-centered filters can be envisaged, a technique known as vestigial side bands." (lines 17-21 in Bigo's Introduction). In contrast, the transmission characteristic according to claim 1 is centered and removes both sidebands.

Upon performing simulations using centered filters in transmitter for both NRZ and RZ formats, Bigo arrives to the conclusion that the simulation indicates that such a method appears

to be useful for RZ format but casts doubts whether it worth using for NRZ format (see the last paragraph of section 2 in Bigo, "Conversely,[...] transmitted."). So Bigo's simulation teach away from the features recited in claim 1, e.g. "wherein the type of modulation of said signal light is determined to be an NRZ modulation type," which is a critical ingredient in order to use the equation model.

B. Bigo does not teach or disclose at least that "filtered signal lights having respective bit rates and frequency spacing to approach a spectrum efficiency maximizing a product of a transmission distance and a transmission capacity of the system" as recited in claim 1.

Miyamoto does not correct or compensate the above-identified failure of Bigo in teaching or suggesting all the features of claim 1.

For at least the above reasons, claim 1 and claims 3-16 depending from claim 1 are patentable.

Claim 17 is patentable at least because Bigo is not an enabling reference as discussed above and the cited prior art references does not disclose the following features recited in claim 17:

- wherein the type modulation of said signal light is determined to be an NRZ modulation type, and
- wherein a bit rate and frequency spacing of the signal lights are set so as to approach a spectrum efficiency at which a product of a transmission distance and a transmission capacity becomes maximum, and actual transmission characteristics at the time of multiplexing and demultiplexing the signal light are set in accordance with said equation model, to transmit the wavelength division multiplexed signal light.

Claims 18, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto as applied to claims 1 and 17 above, and further in view of U.S. Patent 7,035,484 B2 to Silberberg et al. ("Silberberg").

The Office Action submits that Bigo and Miyamoto do not teach polarization independent filters but relies on Silberberg to provide the missing feature. However, the Office Action fails to state a valid reason for combining the teachings of Silberberg with Bigo and Miyamoto. The proffered motivation suffers from the fallacy of circular reasoning. A polarization independent filter does not require polarization control so the POSITA would use a polarization independent filter because it does not require polarization control. In *KSR Corp. v. Teleflex Inc.* (2007), the Supreme Court maintained that the analysis supporting a rejection under 35 U.S.C. 103(a)

should be made explicit, and that it was "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed.¹ Absent a valid reason the combination is merely an impermissible hindsight reconstruction.

Claim 18 is patentable at least because Bigo is not an enabling reference as discussed above, combining the teachings of Silberberg with Bigo and Miyamoto is not properly substantiated, and the cited prior art references does not disclose the following features recited in claim 18:

- a polarization independent filter narrowing a transmission bandwidth of the multiplexed signals,
- wherein the type of modulation of said signal light is determined to be an NRZ modulation type,
- wherein said polarization independent filter has transmission characteristics in which a transmission bandwidth is set in accordance with an equation model expressed by the following equation in which each transmission band $T(f)$ corresponding to each signal light is expressed as a function of a frequency f , f_c being the center frequency of the transmission band, and Δf being a full width at half maximum of the transmission band,
- $$T(f) = 10 \cdot \log \left[\exp \left\{ -2 \cdot \ln \sqrt{2} \cdot \left(\frac{|f - f_c|}{\Delta f/2} \right)^{2n} \right\} \right] \quad (\text{dB})$$
, and
- wherein each component on a short wavelength side and a long wavelength side of each of said optical signals of the plurality of wavelengths is eliminated by said polarization independent filter, thereby generating a wavelength division multiplexed light in which spacing of said optical signals is made narrower than an initial spectrum width to be output .

Claim 20 is patentable at least because Bigo is not an enabling reference as discussed above, combining the teachings of Silberberg with Bigo and Miyamoto is not properly

¹ Often, it will be necessary . . . to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit. KSR, slip op. at 14.

substantiated, and the cited prior art references does not disclose the following features recited in claim 20:

- a polarization independent filter narrowing a bandwidth of a spectrum,
- wherein the type of modulation of said signal light is determined to be an NRZ modulation type,
- wherein each component on a short wavelength side and a long wavelength side of each of said optical signals is eliminated by said polarization independent filter, thereby optical signals with a plurality of wavelengths in which spacing of said optical signals is made narrower than an initial spectrum width to be output.

Claim 20 is patentable at least because Bigo is not an enabling reference as discussed above, combining the teachings of Silberberg with Bigo and Miyamoto is not properly substantiated, and the cited prior art references does not disclose the following features recited in claim 20:

- a polarization independent filter narrowing a transmission bandwidth of the optical signals in the wavelength division multiplexed light,
- wherein the type of modulation of said signal light is determined to be an NRZ modulation type,
- wherein each component on a short wavelength side and a long wavelength side of each of said optical signals of the plurality of wavelengths is eliminated by said polarization independent filter, thereby, in said wavelength multiplexing apparatus, generating a wavelength division multiplexed light in which spacing of said optical signals is made narrower than an initial spectrum width to be output, and in said wavelength demultiplexing apparatus, demultiplexing the optical signals with the plurality of wavelengths in which spacing of said optical signals is made narrower than said initial spectrum width to be output.

The rejection of **independent claim 25** is not properly substantiated in the outstanding Office Action. On the top of page 8 it is merely stated

Regarding claim 25, instant specification admits that when the performance index is maximized, the product of a transmission distance and a transmission capacity is also maximized.

Applicants cannot rebut or respond to such a statement. "Performance index" is not recited in the claims. Only citations of the "Background Art" section of the specification may be cited in rejecting the claims, and not the specification in general.

Therefore, Applicants submit that the outstanding Office Action failed to make a prima facie case for rejecting claim 25. Claim 25 is patentable.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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